

COPY

IN THE CLAIMS:

Please cancel claims 19-34 and 38 without prejudice and amend the claims as follows:

1. (Currently Amended) A method of filling one or more of a via and a trench in a patterned substrate, comprising:
 - a) depositing a generally conformal first barrier layer in one or more of the via and the trench on the patterned substrate by chemical vapor deposition, wherein the first barrier layer is selected from the group consisting of ~~TiSi_xN_y~~, ~~TiN(C)~~, ~~TiNSi(C)~~, Ta, TaC, TaN(C), TaNSi(C), W, WN_x, SiO_xN_y, SiC, AlN, and Al₂O₃;
 - b) removing the first barrier layer from the horizontal surfaces of the patterned substrate;
 - c) depositing a second barrier layer by physical vapor deposition; and then
 - d) depositing one or more conductive materials.
2. (Original) The method of claim 1 wherein depositing the conductive material comprises depositing a seed layer and a metal layer in the via and/or the trench after the second barrier layer is deposited.
3. (Currently Amended) The method of claim 2 wherein the first barrier layer is selected from the group consisting of ~~TiN(C)~~, Ta, TaC, TaN(C), W, WN_x, SiC, AlN, and Al₂O₃.
4. (Previously Presented) The method of claim 1 wherein the second barrier layer is selected from the group consisting of Ta, TaN, TiSiN_x, TaSiN_x, W, and WN_x.
5. (Not Entered) The method of claim 2 wherein the seed layer is copper.
6. (Original) The method of claim 5 wherein the metal layer is copper.

COPYPATENT
Atty. Dkt. No. AMAT/1931.P1/CPV/COPPER/PJS

7. (Original) The method of claim 1 wherein the first barrier layer is deposited and removed from the horizontal surfaces of the patterned substrate within a single chamber of an integrated processing tool.
8. (Original) The method of claim 7 wherein the chamber is a chemical vapor deposition chamber and the first barrier layer is deposited and etched in the chamber.
9. (Original) The method of claim 2 wherein the seed layer is deposited by physical vapor deposition.
10. (Original) The method of claim 2 wherein the seed layer is deposited by chemical vapor deposition.
11. (Original) The method of claim 2 wherein the seed layer is deposited by electroless deposition.
12. (Original) The method of claim 2 wherein the metal layer is deposited by physical vapor deposition.
13. (Original) The method of claim 2 wherein the metal layer is deposited by chemical vapor deposition.
14. (Original) The method of claim 2 wherein the metal layer is deposited by electroplating.
15. (Original) The method of claim 1 wherein the via has an aspect ratio of about 4 to 1 and the trench has an aspect ratio of about 1 to 1.
16. (Original) The method of claim 1 wherein the second barrier layer has a thickness of from about 20 Å to about 50 Å at the bottom of the via.

COPY

PATENT
Att. Dkt. No. AMAT/1931.P1/CPVCOPPER/PJS

17. (Original) The method of claim 1 wherein the second barrier layer is selected from the group consisting of Ta, TaN, W, WN_x, Ti, and TiN, and the second barrier layer has a thickness of from about 20 Å to about 50 Å at the bottom of the via.

18. (Currently Amended) A method of filling one or more of a via and a trench in a patterned substrate, comprising:

a) depositing a generally conformal first barrier layer on the patterned substrate by atomic layer deposition, wherein the first barrier layer is selected from the group consisting of Ta, TaN, W, and WN;

b) removing the first barrier layer from the horizontal surfaces of the patterned substrate;

c) depositing a second barrier layer by physical vapor deposition; and then

d) depositing one or more conductive materials.

19-34. (Canceled)

35. (Original) A method of filling one or more of a via and a trench in a patterned substrate having an etch stop at the via level, comprising:

a) depositing a generally conformal first barrier layer on the patterned substrate by chemical vapor deposition;

b) removing the first barrier layer from the horizontal surfaces of the patterned substrate;

c) removing the etch stop from the bottom of the via;

d) depositing a second barrier layer by physical vapor deposition; and then

e) depositing one or more conductive materials.

36. (Original) The method of claim 35 wherein depositing the conductive material comprises depositing a seed layer and a metal layer in the via and/or the trench after the second barrier layer is deposited.

COPY

PATENT
Atty. Dkt. No. AMAT/1931.P1/CPI/COOPER/PJS

37. (Currently Amended) A method of filling one or more of a via and a trench in a patterned substrate having a metal layer underlying the via, comprising:

- a) depositing a generally conformal first barrier layer on the patterned substrate by chemical vapor deposition, wherein the first barrier layer is selected from the group consisting of ~~TiSi₃N₄, TiN(C), TiNSi(C)~~, Ta, TaC, TaN(C), TaNSi(C), W, WN_x, SiO_xN_y, SiC, AlN, and Al₂O₃;
- b) removing the first barrier layer from the horizontal surfaces of the patterned substrate;
- c) depositing by physical vapor deposition a second barrier layer sufficient to provide a barrier on the bottom of the trench without significantly impairing conduction between the conductive material deposited in the via and the metal layer; and then
- d) depositing one or more conductive materials.

38-40. (Canceled)